REMARKS

Reconsideration and allowance are respectfully requested in light of the above amendments and the following remarks.

Before this Amendment, claims 8-34, 36-38, 40, and 42-48 were pending in the application. Of these, claims 8-34, 37, 38, and 43-48 have been withdrawn from consideration, and claims 36, 40, and 42 are amended herein. New claims 49-51 are added herein. Each of the pending claims is believed to define an invention that is both novel and non-obvious.

The Applicants wish to thank the Examiner for the courtesy shown to their representative during a personal interview on October 15, 2002. A summary of the discussion during the interview is provided below.

The amendment filed on February 7, 2002, has been objected to for introducing new matter. According to the Office Action, the new matter is the feature "including at least one peak value within the wavelength to be used," which was added to claims 36, 40, and 42. Claims 36, 40, and 42 have also been rejected under 35 USC §112, first paragraph, for containing the above-quoted subject matter.

During the interview, a proposed amendment was discussed for overcoming both the objection to the February 7, 2002, amendment and the 35 USC §112, first paragraph, rejections. The proposed

amendment has been incorporated into each of claims 36, 40, and 42 so that they now recite "including at least one peak value within the wavelength range to be used." It was agreed during the interview that this revision would overcome the standing objection and the 35 USC §112, first paragraph, rejections.

Claims 36, 40, and 42 were rejected, under 35 USC §103(a), as being obvious over Sakata (US 4,729,640). Inasmuch as these rejections may be applied against the amended and new claims, the Applicants respectfully traverse.

Each of claims 36, 40, and 42 has been amended to recite, in relevant part:

> *said first relief pattern has a wavelength dependent phase amplitude $a_1(\lambda)$, said second relief pattern has a wavelength dependent phase amplitude $a_2(\lambda)$, said diffractive element has a phase amplitude $a(\lambda)$ which is a sum of said phase amplitudes $a_1(\lambda)$ and $a_2(\lambda)$ and includes at least one peak value within the wavelength range to be used.*

(Emphasis added). It is respectfully submitted that Sakata fails to disclose or suggest a diffractive optical element having a phase amplitude which is defined by a sum of the phase amplitudes of the first and second relief patterns and includes a peak value, as now recited by present claims 36, 40, and 42.

The Office Action states the reason for the obviousness rejections is set forth in the previous Office Action, dated August 7, 2001. Additionally, the Office Action states that the

feature concerning the "peak" is rejected based on 35 USC §112, first paragraph. The 35 USC §112, first paragraph, rejections have been overcome by amendment. The Applicants reiterate their arguments to overcome the prior art rejections made in their previous Response. New claims 49-51 recite similar features to those of claims 36, 40 and 42. Thus, it is submitted that claims 49-51 are allowable for similar reasons that claims 36, 40, and 42 are allowable.

In view of the above, it is submitted that all pending claims are directed to allowable subject matter and that this application is in condition for allowance. A notice to that effect is respectfully solicited.

If any issues remain which may best be resolved through a telephone communication, the Examiner is requested to telephone the undersigned at the local Washington, D.C. telephone number listed below.

Respectfully submitted,

Date: October 15, 2002
JEL/DWW/att

James E. Ledbetter
Registration No. 28,732
David W. Ward
Registration No. 45,198

Attorney Docket No. JEL 30290A
STEVENS DAVIS, MILLER & MOSHER, L.L.P.
1615 L Street, N.W., Suite 850
P.O. Box 34387
Washington, D.C. 20043-4387
Telephone: (202) 408-5100
Facsimile: (202) 408-5200

Exhibit I

IN THE CLAIMS:

Kindly amend the claims as follows:

36. (Twice Amended) A diffractive optical element comprising:

a first optical region made of a first optical material which is substantially transparent to light within a wavelength range to be used and has a refractive index n_1;

a second optical region made of a second optical material which is substantially transparent to said light but is different from said first optical material and has a refractive index n_2;

a third optical region made of a third optical material which is transparent to said light but is different from said second optical material and has a refractive index n_3, said first, second and third optical regions being arranged to be brought into contact with each other or being arranged close to each other;

a first relief pattern formed in a boundary surface between said first and second optical regions and having a first pitch distribution [and a depth d_1]; and

a second relief pattern formed in a boundary surface between said second and third optical regions and having a second pitch

distribution which is substantially identical with said first pitch distribution of the first relief pattern [and a second depth d_2], said first and second relief patterns being substantially aligned in a direction of an optical axis of the diffractive optical element, wherein

said first relief pattern has a wavelength [depending] dependent phase amplitude $a_1(\lambda)$, said second relief pattern has a wavelength [depending] dependent phase amplitude $a_2(\lambda)$, said diffractive element has a phase amplitude $a(\lambda)$ which is a sum of said phase amplitudes $a_1(\lambda)$ and $a_2(\lambda)$ and includes at least one peak value within the wavelength range to be used.

40. (Twice Amended) A diffractive optical element comprising:

a first optical region made of a first optical material which is substantially transparent to light within a wavelength range to be used and has a refractive index n_1;

a second optical region made of a second optical material which is substantially transparent to said light but is different from said first optical material and has a refractive index n_2;

a third optical region made of a third optical material which is transparent to said light but is different from said second optical material and has a refractive index n_3, said first, second and third optical regions being arranged to be

brought into contact with each other or being arranged close to each other;

a first relief pattern formed in a boundary surface between said first and second optical regions and having a first pitch distribution [and a depth d_1]; and

a second relief pattern formed in a boundary surface between said second and third optical regions and having a second pitch distribution which is substantially identical with said first pitch distribution of the first relief pattern [and a second depth d_2], said first and second relief patterns being substantially aligned in a direction of an optical axis of the diffractive optical element, wherein

said first relief pattern has a wavelength [depending] dependent phase amplitude $a_1(\lambda)$, said second relief pattern has a wavelength [depending] dependent phase amplitude $a_2(\lambda)$, said diffractive element has a phase amplitude $a(\lambda)$ which is a sum of said phase amplitudes $a_1(\lambda)$ and $a_2(\lambda)$ and includes at least one peak value within the wavelength range to be used, wherein when an average refractive index of a composite relief structure constituted by the first and second relief patterns is n_0, a thickness of the diffractive element is D, and a smallest pitch of the relief patterns is T, the following condition is satisfied:

$$\frac{2\pi\lambda D}{n_0 T^2} < 1 .$$

42. (Twice Amended) A diffractive optical element comprising:

a first optical region made of a first optical material which is substantially transparent to light within a wavelength range to be used and has a refractive index n_1;

a second optical region made of a second optical material which is substantially transparent to said light but is different from said first optical material and has a refractive index n_2;

a third optical region made of a third optical material which is transparent to said light but is different from said second optical material and has a refractive index n_3, said first, second and third optical regions being arranged to be brought into contact with each other or being arranged close to each other;

a first relief pattern formed in a boundary surface between said first and second optical regions and having a first pitch distribution [and a depth d_1]; and

a second relief pattern formed in a boundary surface between said second and third optical regions and having a second pitch distribution which is substantially identical with said first pitch distribution of the first relief pattern [and a second

depth d_2], said first and second relief patterns being substantially aligned in a direction of an optical axis of the diffractive optical element, wherein

said first relief pattern has a wavelength [depending] dependent phase amplitude $a_1(\lambda)$, said second relief pattern has a wavelength [depending] dependent phase amplitude $a_2(\lambda)$, said diffractive element has a phase amplitude $a(\lambda)$ which is a sum of said phase amplitudes $a_1(\lambda)$ and $a_2(\lambda)$ and includes at least one peak value within the wavelength range to be used, wherein when a shortest wavelength of the wavelength range to be used is λ_1, a longest wavelength of the wavelength range to be used is λ_2, and a middle wavelength between λ_1 and λ_2 is λ_0 $(=(\lambda_1 + \lambda_2)/2)$, the following condition is satisfied:

$$\lambda_2 - \lambda_1 > 0.05\lambda_0.$$